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IS 4410-16-2 (1981): Glossary of terms relating to river valley projects, Part 16: Gates and valves, Section 2: Valves [WRD 12: Hydraulic Gates and Valves]



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(Reaffirmed 2001)

Indian Standard

GLOSSARY OF TERMS
RELATING TO RIVER VALLEY PROJECTS

PART XVI GATES AND VALVES

Section 2 Valves

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GLOSSARY OF TERMS RELATING TO RIVER VALLEY PROJECTS

PART XVI GATES AND VALVES

Section 2 Valves

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Indian Standard

**GLOSSARY OF TERMS
RELATING TO RIVER VALLEY PROJECTS**

PART XVI GATES AND VALVES

Section 2 Valves

0. FOREWORD

0.1 This Indian Standard (Part XVI/Sec 2) was adopted by the Indian Standards Institution on 27 November 1981, after the draft finalized by the Terminology Relating to River Valley Projects Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 A number of Indian Standards have been published covering various aspects of river valley projects and a large number of similar standards are in the process of formulation. These standards include technical terms, precise definitions of which are required to avoid ambiguity in their interpretation. To achieve this end, the Indian Standards Institution is bringing out this glossary of terms relating to river valley projects (IS : 4410), which is being published in parts. Part XVI covers the important field of gates and valves. It has got two sections, this section dealing with valves and the other section with gates (already published).

0.3 In the formulation of this standard, due weightage has been given to international co-ordination among the standards and practices prevailing in different countries in addition to relating it to the practices in the field in India. This has been met by deriving assistance from the following publications:

ASCE. American Society of Civil Engineers. Nomenclature for hydraulics. 1962. New York.

Design Standards No. 7 Valves, Gates and Steel Conduits, United States, Department of the Interior Bureau of Reclamation Commissioner's Office. Denver, Colorado.

India. International Commission on Irrigation and Drainage.

Multilingual technical dictionary on irrigation and drainage. 1967.

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India. Central Board of Irrigation and Power. Glossary of irrigation and hydro-electric terms and standard notations used in India. 1954. Manager of Publications. Delhi.

0.3.1 All the definitions taken from 'Multilingual technical dictionary on irrigation and drainage' are marked with asterisk (*) in the standard.

1. SCOPE

1.1 This standard (Part XVI/Sec 2) covers the definitions of the terms relating to valves.

2. VALVES

2.1 Air Valve — A valve that releases air from a pipeline automatically without loss of water, or introduces air into a line automatically if the internal pressure becomes less than the atmospheric pressure.

2.2 Air Inlet Valve — An air valve that introduces air into a pipeline automatically when the internal pressure falls short of the atmospheric pressure by an amount to suit the requirements of a particular system.

2.3 Air Outlet Valve — An air valve that releases air from a pipeline automatically without loss of water.

2.4 Air Relief Valve — An air valve provided on high locations of pipeline for letting out air automatically and preventing the pipeline from becoming air bound with a resultant increase in pressure.

2.5 Altitude Control Valve — A valve which automatically shuts off the flow when the water level reaches a predetermined elevation in an elevated tank and opens when the pressure on the pump side is less than that on the tank side of the valve.

2.6 Angle Valve — A valve having generally a spherical body in which the body ends are at right angles to each other and in which the disc is lifted from or lowered on the body seat by a spindle whose axis is in line with that of one body end.

2.7 Automatic Valve — A valve which opens or closes automatically when prescribed conditions are reached.

2.8 Balanced Needle Valve — A needle valve of improved design in which the needle is moved by water pressure from the outlet conduit, which acts on interior chambers in the valve. The movement is

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controlled by a hand wheel installed above the valve, with the motion transmitted through shafting and gearing to a positive positioning device located inside the valve (see Fig. 1).

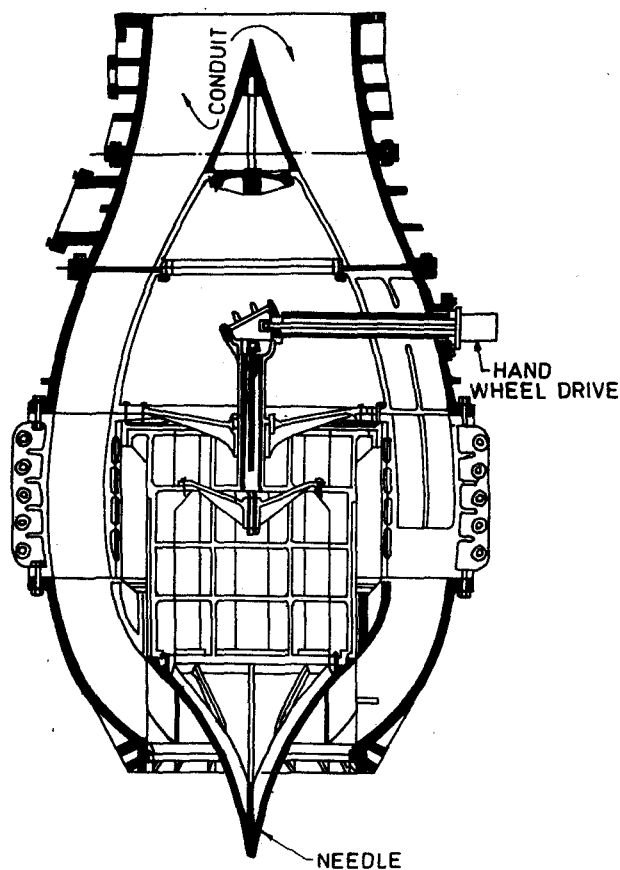


FIG. 1 BALANCED NEEDLE VALVE

2.9 Balanced Valve — A valve with both sides of the closing mechanism in contact with water, and which opens and closes due to the difference in water pressure, or water pressure plus other pressure, exerted upon the sides of the closing mechanism.

2.10 Ball Valve — A simple non-return valve consisting of a ball resting on a cylindrical seat.

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2.11 Bib Tap — A valve closed by screwing down a leather or fibre washered disk onto a seat in the valve body.

2.12 Blow-off or Scour Valve — A take-out connection with a gate valve placed at or near the low point of a syphon:

- a) to empty the syphon when necessary to make repairs;
- b) to use it as a wasteway; and
- c) to scour out material deposited in the syphon.

2.13 Filling Valve — A relatively small gate for by passing a main gate.

2.14 Bypass Valve — A small pilot valve used in connection with a larger valve or a gate to equalize the pressure on both sides of the larger valve or a gate before opening it.

2.15 Butterfly Valve — A valve in which the disk is turned about 90° from the close to the open position, about a spindle supported on the body of the valve on an axis transverse to that of the valve (see Fig. 2).

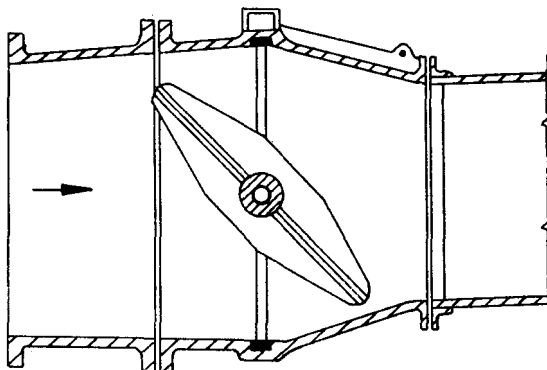


FIG. 2 BUTTERFLY VALVE

2.16 Check Valve or Non-return Valve — A valve which prevents reversal of flow by means of the check mechanism, the valve being opened by the flow of fluid and closed by the weight of the check mechanism when the flow ceases, or by back pressure.

2.17 Cone Valve — A valve in which the moving plug is conical.

2.18 Double Flanged Valve — Valves which are intended 'specifically' for use with two sets of bolts, each flange being individually bolted.

2.19 Drainage Valve/Wash-out Valve — A valve installed in a low point or depression on a pipeline to allow drainage of the line.

2.20 Ensign Valve — A needle valve submerged in the reservoir and the needle moved by reservoir water pressure by controlling the pressure in an interior chamber. It is named after the inventor O. H. Ensign of Bureau of Reclamation (USA) (see Fig. 3).

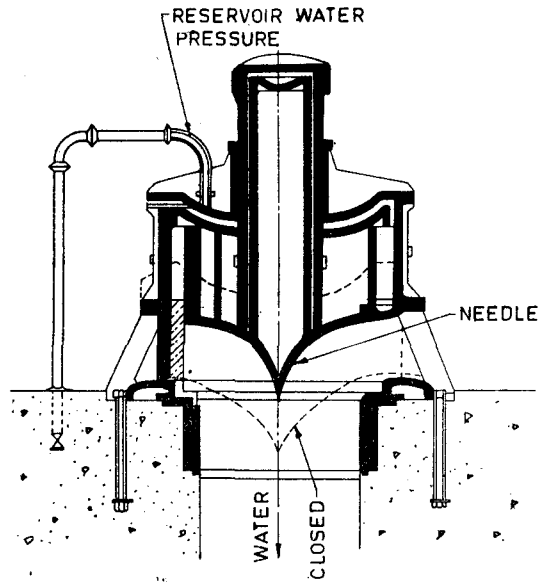


FIG. 3 ENSIGN VALVE

2.21 Flap Valve — A valve which is hinged at one edge, and which opens and shuts through rotation about such hinge.

2.22 Float Valve — A valve wherein the plug is actuated by a float to control the flow.

2.23 Flow-control Valve — An automatic valve that controls the rate of flow of a fluid.

2.24 Foot Valve — A valve generally placed at the lower end of the suction pipe to prevent the suction pipe from emptying.

2.25 Four-way Valve — A valve constructed with four fluidways and with a movable element operated by a quarter turn to provide passage between either pair of adjacent fluidways.

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2.26 Free-discharge Tube Valve — A tube type valve used at the downstream ends of conduits and having short bodies with a 45° nozzle.

2.27 Gate Valve — A valve through which the flow of fluid is controlled by means of gate in the form of a wedge or disc between the body ends which are in line with each other; the gate is actuated by a spindle whose axis is at right angles to that of the body ends.

2.28 Globe Valve (or Screw-down Stop Valve) — A valve having generally a spherical body in which the body ends are in line with each other end in which the disc is lifted from or lowered on to the body seat by a spindle whose axis is at right angles to that of the body ends. In globe valves, the pressure acts on the underside of the valve disc and there is a change of direction of flow inside the valve body.

2.29 Hollow Jet Valve — A high pressure valve wherein a needle, when moved downstream to open the valve, releases water in the form of a hollow jet (see Fig. 4).

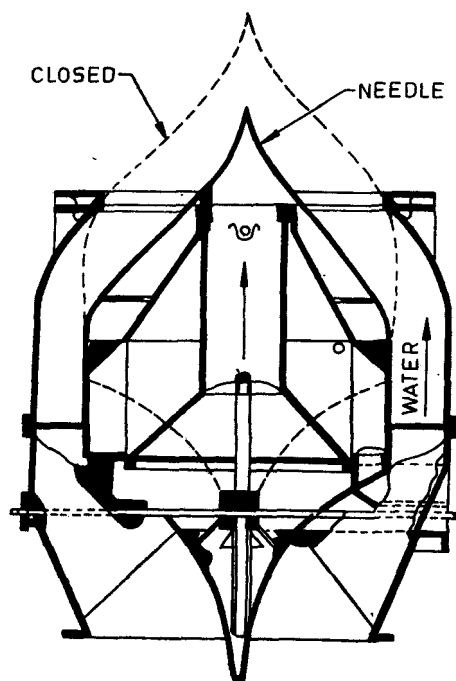


FIG. 4 HOLLOW JET VALVE

2.30 Howell-bunger Valve/Cylindrical Valve — A valve having two telescopic cylinders with a streamline dispersing cone secured to the inner cylinder by radial ribs. The outer cylinder closes the sideways opening between the cone and the inner cylinder when it is slid in position. In its open position, the water is discharged on the sides of the cylinder in the form of a highly diverging hollow inside in the shape of a cone (see Fig. 5).

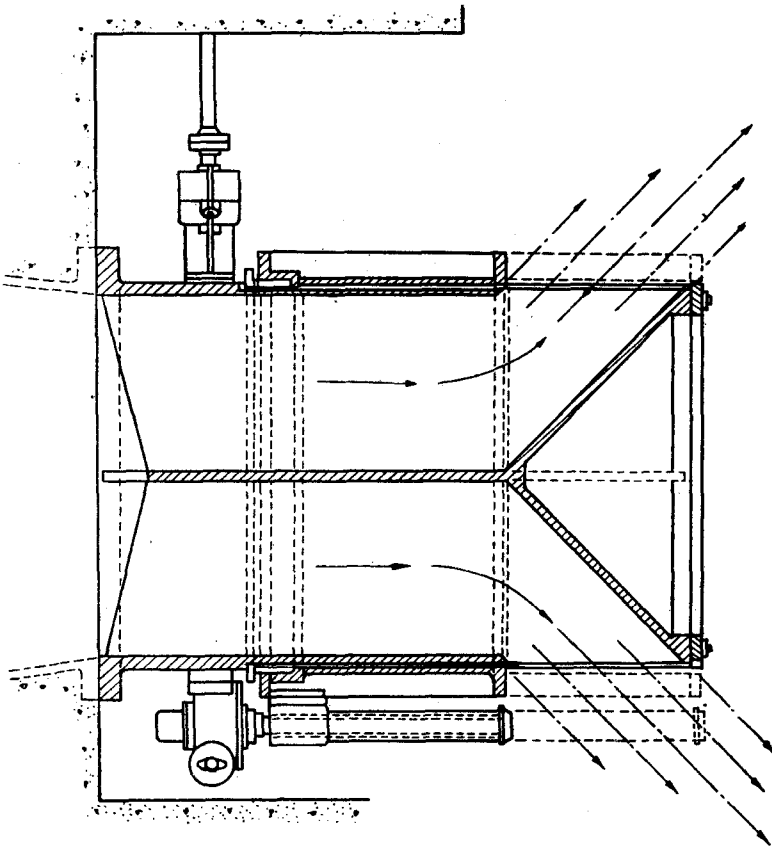


FIG. 5 HOWELL-BUNGER VALVE/CYLINDRICAL VALVE

2.31 Hydraulic Valve or Regulating Valve — A valve to regulate or control flow in conduits, pipelines and penstocks operated by means of a hydraulic cylinder or any other device.

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2.32 In-line Tube Valve — A tube type valve used in the central portion of conduits and having long bodies with a 30° nozzle. The valve is provided with air inlets to aerate the jet immediately downstream from the valve seat.

2.33 Interior Differential Needle Valve — A differential needle valve with a needle that telescopes over a member fixed to the valve body instead of moving within the valve body as in the case of an internal differential needle valve (see Fig. 6).

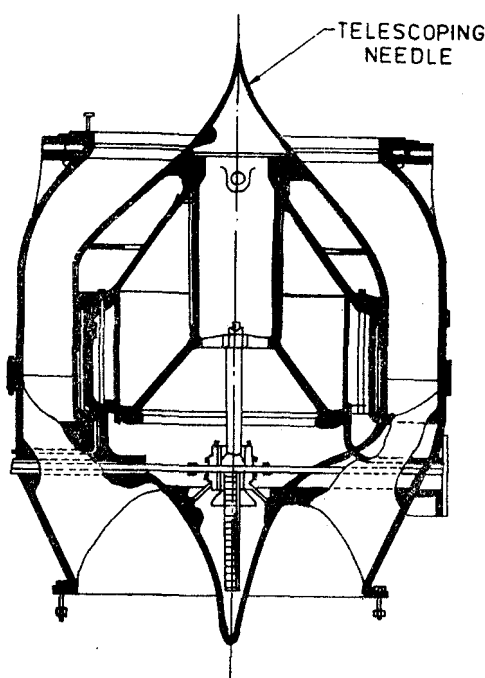


FIG. 6 INTERIOR DIFFERENTIAL NEEDLE VALVE

2.34 Internal Differential Needle Valve — This is an improved type of balanced needle valve with three chambers in the needle. The two end chambers are connected. The valve is operated by the differential thrust resulting from the changes in pressure in the end chambers with respect to that in the central chamber through a valve paradox (see Fig. 7).

2.35 Lock Gate Valve — A valve, such as register valve, slide valve and butterfly valve, fitted in lock gates to facilitate filling and emptying of the lock chamber.

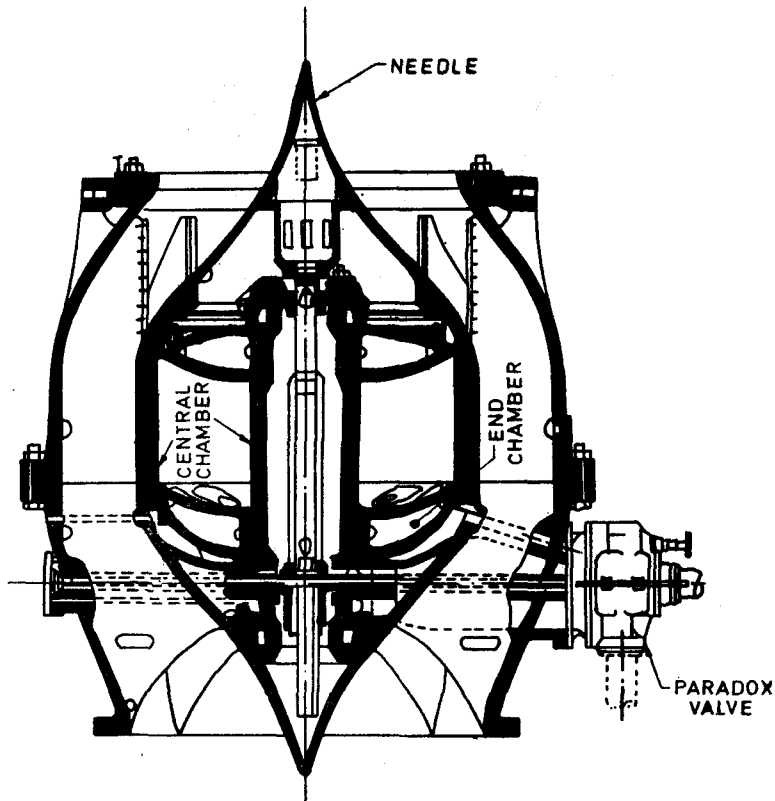


FIG. 7 INTERNAL DIFFERENTIAL NEEDLE VALVE

2.36 Low Leakage Rate Valve — A valve which has an agreed amount of leakage in the closed position.

2.37 Motor-operated Needle Valve* — A needle valve in which the position of the needle is controlled by a motor-operated rod (*see* Fig. 8).

2.38 Mud Valve — A plug valve for draining out sediment, inserted in the bottom of settling tanks.

2.39 Needle Valve — A valve with a circular outlet through which the flow is controlled by means of a tapered needle which extends through the outlet, reducing the area of the outlet as it extrudes, and enlarging the area as it retreats.

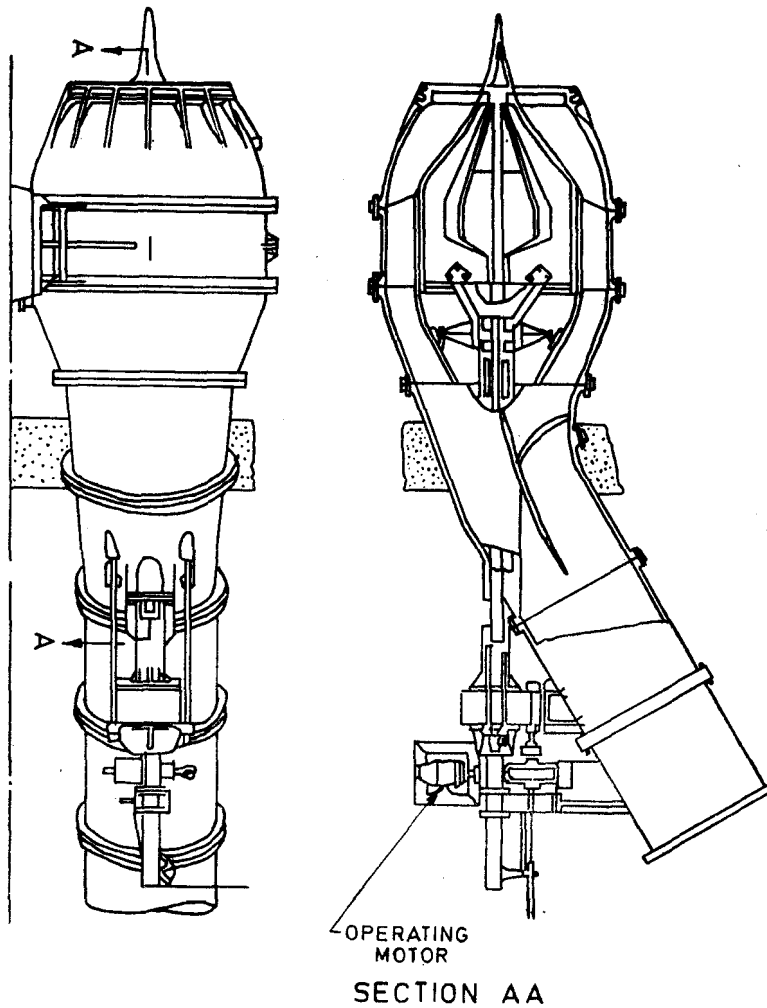


FIG. 8 MOTOR-OPERATED NEEDLE VALVE.

2.40 Paradox Control — It is an automatic mechanical follow-up valve, which controls water pressure to ensure positive functioning of a needle (of needle valves). This control is arranged to cause the needle (of needle valves) to follow the movement of the control device (stand hand wheel) and to maintain automatically the needle (of needle valves) in the position set by the control device (stand hand wheel). A position

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indicator is provided in the control stand to give the operator the exact needle position.

This control system makes it possible to move hydraulically the needle throughout the extreme ranges of travel without requiring the presence of water in the conduits. It also makes the routine inspection and scale removal operations much easier to perform.

2.41 Parallel Slide Valve — It is essentially a gate valve in which the gate consists of two discs, without spreading mechanism, except for a spring which slides between two parallel body seats.

2.42 Pilot Valve — A small valve to admit liquid to operate a bigger valve.

2.43 Plug Valve — A valve in which the movable control element is a cylindrical or conical plug in contrast to a flat disc.

2.44 Poppet Valve or Mushroom Valve — A valve consisting of a flat disk which raises and lowers without rotation about the valve opening, being kept in position and path of travel by a rod or shaft attached to the disk at right angles to it, extending through the valve opening into a groove or hole which guides its movement.

2.45 Pressure-reducing Valve — A valve for reducing pressure automatically, according to the setting of the pressure regulating valves.

2.46 Pressure-regulating Valve — A valve placed at either end of a pressure regulating apparatus to regulate the pressure.

2.47 Pressure-relief Valve/Relief Valve/Safety Valve — A valve which opens automatically when the pressure reaches an assigned limit.

2.48 Priming Valve — A valve connected with the discharge pipe of a force pump through which the pump may be primed.

2.49 Radial Gate Valve — A valve in the form of a radial gate used in the inlet or outlet of a conduit.

2.50 Reflux Valve — A non-return valve used in a pipeline at a rising gradient to prevent water which is ascending the gradient from flowing back in the event of a burst lower down.

2.51 Register Valve — A mechanical device in which the travel of the valve from the closed to the open position is equal to the height of one of the openings.

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2.52 Safety Valve — *See 2.47.*

2.53 Screw-down Stop Valve — A valve in which the disk is lifted from and lowered on to the body seat by a stem whose axis is perpendicular to the face of the body seat.

2.54 Slide Gate Valve — A slide gate used in the inlet or outlet conduit of a lock to control the level of water in the lock chamber.

2.55 Sliding Sleeve Valve — A valve having two telescopic cylinders with a streamline dispersing cone secured to the inner cylinder by radial ribs. The inner sleeve closes the opening between the cone and outer sleeve when it is slid in position. In its open position, the water jet is discharged at 90° with respect to the axial centreline of the valve (*see Fig. 9*).

2.56 Sluice Valve — Any valve installed in a conduit or a pipeline to control the flow. In river valley projects, this term is generally applied to valves which are relatively big in size.

2.57 Spherical or Rotary Valve — A valve consisting of a casing more or less spherical in shape, the gate turning on trunions through 90° when opening or closing, and having a cylindrical opening of the same diameter as that of the pipe it serves (*see Fig. 10*).

2.58 Stop Valve — A valve with suitable means of connection for insertion in a pipeline for controlling or stopping flow.

2.59 Three-way Valve — A valve constructed with three fluid ways and with a moveable element operated by a quarter turn to provide passage between either pair of adjacent fluidway.

2.60 Throttle Valve — A valve used only to restrict the amount of flow in the pipeline.

2.61 Tube Valve — An improvement over the needle valve. The water passages are similar to the internal differential valve, except that the downstream end of the needle is omitted. A tube or hollow cylinder similar to that of the cylinder gate, instead of a needle, comprises the moving part of the valve. This is actuated by a hydraulic cylinder and piston and a pressure pump or by a screw with an electric motor, or by manual control (*see Fig. 11*).

2.62 Vacuum Valve — An air valve which permits ingress of air into an empty pipe to counteract a vacuum.

2.63 Valve — A device installed in a pipeline for the purpose of controlling the magnitude and direction of the flow.

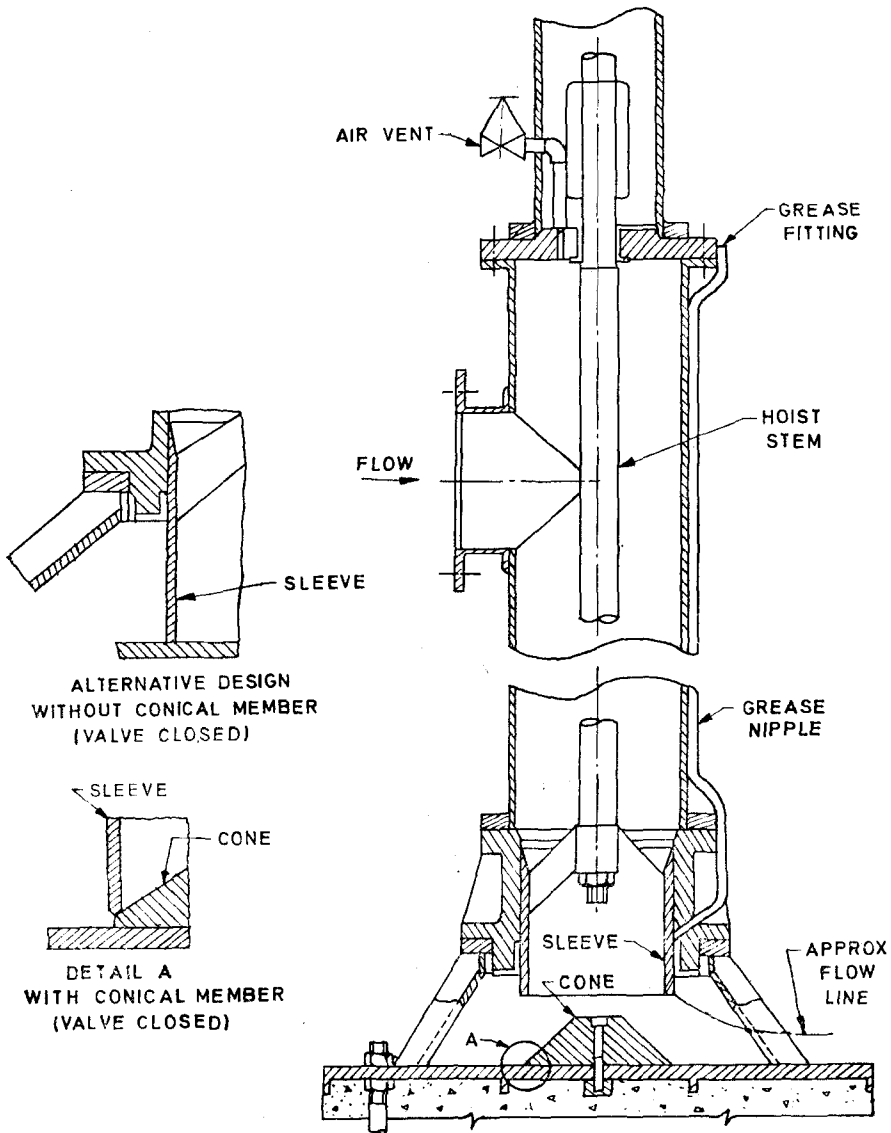


FIG. 9 SLIDING SLEEVE VALVE

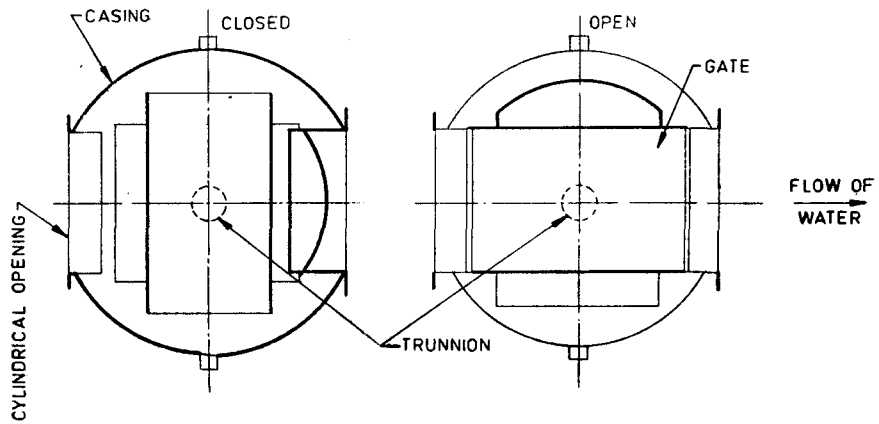


FIG. 10 SPHERICAL OR ROTARY VALVE

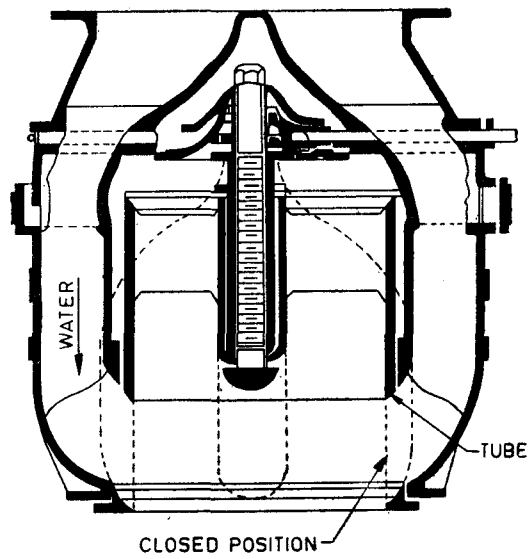


FIG. 11 TUBE VALVE

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	$1 \text{ N} = 1 \text{ kg.m/s}^2$
Energy	joule	J	$1 \text{ J} = 1 \text{ N.m}$
Power	watt	W	$1 \text{ W} = 1 \text{ J/s}$
Flux	weber	Wb	$1 \text{ Wb} = 1 \text{ V.s}$
Flux density	tesla	T	$1 \text{ T} = 1 \text{ Wb/m}^2$
Frequency	hertz	Hz	$1 \text{ Hz} = 1 \text{ c/s (s}^{-1}\text{)}$
Electric conductance	siemens	S	$1 \text{ S} = 1 \text{ A/V}$
Electromotive force	volt	V	$1 \text{ V} = 1 \text{ W/A}$
Pressure, stress	pascal	Pa	$1 \text{ Pa} = 1 \text{ N/m}^2$

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